OFF AIRCRAFT MAINTENANCE WITH ILLUSTRATED PARTS BREAKDOWN

DESCRIPTION AND PRINCIPLES OF OPERATION

A/A24A-56 HELMET UNIT, INTEGRATED (JOINT HELMET MOUNTED CUEING SYSTEM)

Reference Material

None

Alphabetical Index

Record of Applicable Technical Directives

None

1. DESCRIPTION.

2. A/A24A-56 HELMET UNIT, INTEGRATED (JOINT HELMET MOUNTED CUEING SYSTEM).

3. The A/A24A-56 Helmet Unit, Integrated (Joint Helmet Mounted Cueing System) is a display system used to display cueing symbology for navigation, weapons and sensors at high off boresight angles. The system uses miniature components mounted on a detachable helmet display unit (HDU). This helmet display unit (HDU) allows symbology to be projected on the pilot's visor. See figure 1.

4. The (HDU) has a built in hinge pivot that allows symbology to be displayed and fold clear of the visor assembly when the visor is retracted.

NOTE

On the HDU mating connector there is a smaller pin that is a safety device of the CROWBAR safety circuitry. DO NOT try to pull pin out.

5. The (HDU) is made up of the components listed below:

a. cathode ray tube (CRT) assembly

b. relay optics assembly

c. magnetic receiver unit (MRU)

d. camera

e. automatic brightness control (ABC) sensor

f. up-look reticles (puppers)

g. visor assembly.

6. CATHODE RAY TUBE (CRT) ASSEMBLY.

7. The cathode ray tube (CRT) provides the various symbology to be projected on the visor assembly.

8. The CRT assembly is made of a light-weight housing that provides a means of attachment to the relay optics assembly using a quarter turn locking flange.

9. A CRT EEPROM and a cathode ray tube make up the remainder of the CRT assembly. The CRT EEPROM contains the serial number, elapsed time, fault record and electron beam correction data. Each of these components are permanently bonded to the total CRT assembly. The CRT assembly has one electrical connector and weighs 2.3 ounces.

10. RELAY OPTICS ASSEMBLY.

11. The relay optics assembly is made up of four lenses and two mirrors within a light-weight plastic housing. It provides the optical transmission of the symbology produced by the CRT assembly on the visor assembly.

12. MAGNETIC RECEIVER UNIT (MRU).

13. The magnetic receiver unit (MRU) is a miniature version of the magnetic transmitter unit. It contains three coils that represent the X, Y, and Z axes of the system.

14. CAMERA.

15. The camera is monochromatic with a field of view (FOV) the same as the HDU 20° FOV. The camera image is combined with display symbology by the electronic unit (EU). This composite video is available for recording purposes.

16. AUTOMATIC BRIGHTNESS CONTROL SENSOR.

17. The automatic brightness control (ABC) sensor, is used to determine ambient light and adjust the CRT brightness to maintain a constant display contrast ratio.

18. UP-LOOK RETICLES.

19. The up-look reticle assemblies provide a pair of symbols known as puppers. When selected, using HOTAS, these symbols are used for high off-boresight targeting. The up-look reticles are not adjustable and the reticle projected is 27.5° above and 30° left or right of the eye.

20. VISOR ASSEMBLY.

21. The visor assembly provides two functions. First, it provides the pilot with protection from sun and wind. Second, it provides a surface for symbology to be presented.

22. The visor can be rotated back over the top part of the helmet. A locking device is used in both the

retracted and deployed visor positions to make sure the visor does not move.

23. UPPER HELMET VEHICLE INTERFACE.

24. The upper helmet vehicle interface (HVI) is one of two electrical cables connecting the HDU to the aircraft. The voltages and signals required to operate the HDU pass through this cable.

25. The upper HVI is routed through the helmet and terminates at the quick disconnect connector (QDC). The upper HVI contains the universal connector (UC), the helmet release connector (HRC), and the top half of the hip-mounted QDC.

26. The UC allows the display unit (DU) to be removed from the helmet. The UC provides a means to attach other devices, for example, night vision goggles, to the existing helmet system. The HRC provides a break point that allows the helmet to leave the pilot's head cleanly, so the helmet is not pulled back toward the pilot. The QDC provides the interface between the pilot and the aircraft.

27. TECHNICAL CHARACTERISTICS.

28. The HDU technical characteristics include the Field of View (FOV) of 20° monocular and weighing approximately 4.0 pounds.

29. PRINCIPLES OF OPERATION.

30. Figure 1 shows the helmet display unit components. Figure 2 shows a block diagram of the helmet display unit.

31. CATHODE RAY TUBE ASSEMBLY.

32. The cathode ray tube (CRT) assembly produces the symbols that are reflected over the pilot's right eye. The signal from the universal connector is passed to the microcontroller. The CRT uses a characterization PROM to store the CRT unique normalization parameters.

33. RELAY OPTICS ASSEMBLY.

34. The relay optics assembly routes the image from the CRT to the visor assembly.

35. MAGNETIC RECEIVER UNIT.

36. The magnetic receiver unit (MRU) receives the transmitted magnetic signal from the magnetic transmitter unit (MTU) and provides a signal to the electronics unit line of sight module. The signal is used to determine the line of sight (LOS) and position of the pilot's head.

37. CAMERA.

38. The camera field of view is the same as the helmet. A video signal is transmitted between the electronics unit (EU) and the camera by way of the HVI. The camera records the pilot's view. The electronics unit combines the pilot's view with the displayed symbology on the image for recording purposes.

39. AUTOMATIC BRIGHTNESS CONTROL SENSOR.

40. The automatic brightness control (ABC) sensor senses ambient light and adjusts the CRT brightness to maintain a constant display contrast ratio.

41. UP-LOOK RETICLES (PUPPERS).

42. The up-look reticles are two light emitting diodes (LED) which are displayed on the HDU visor. When enabled, the electronics unit determines which LED to activate, based on the pilot's head position, and modifies the HDU LOS output to consider the angle of the activated up look reticle.

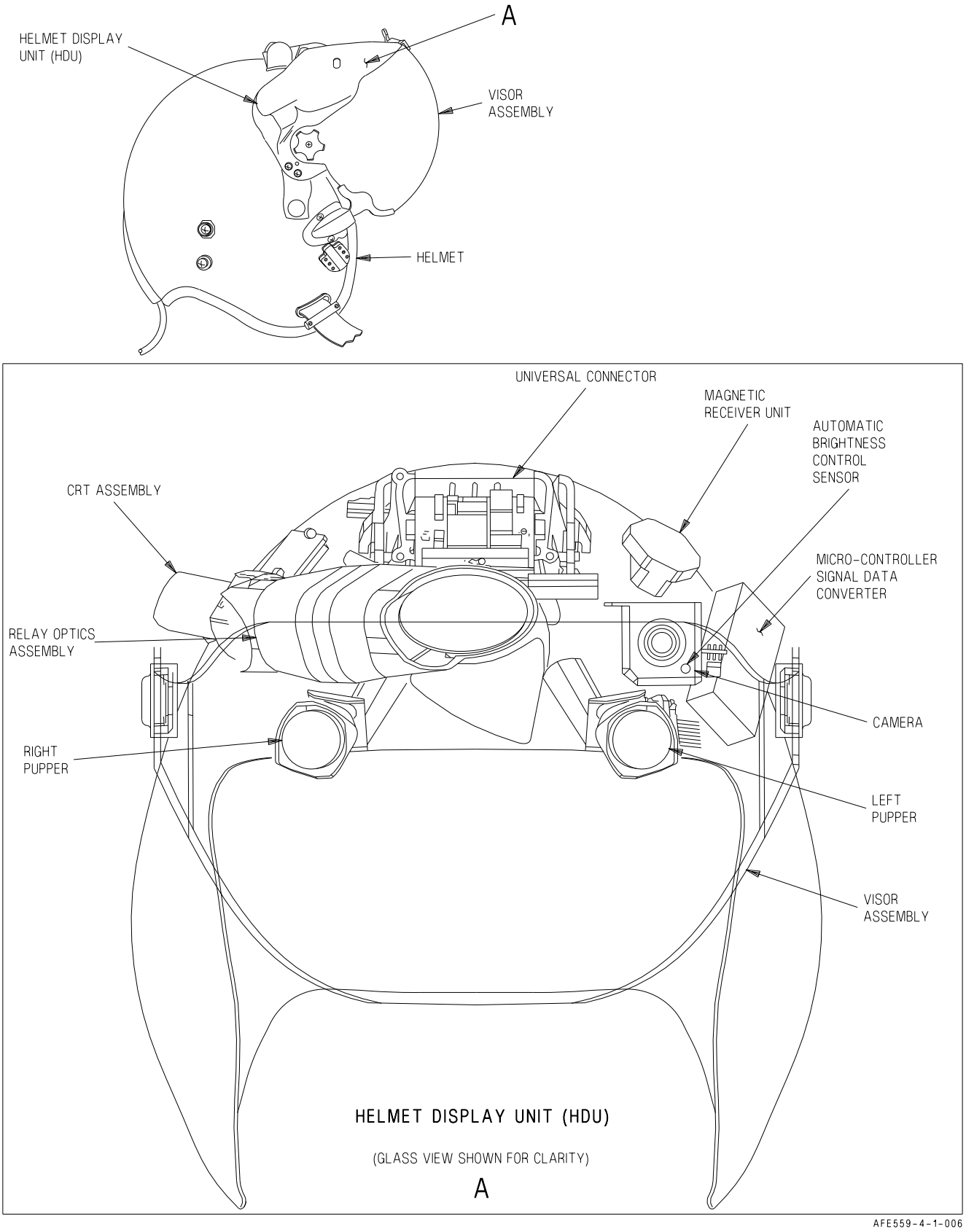

Figure 1. Helmet Display Unit

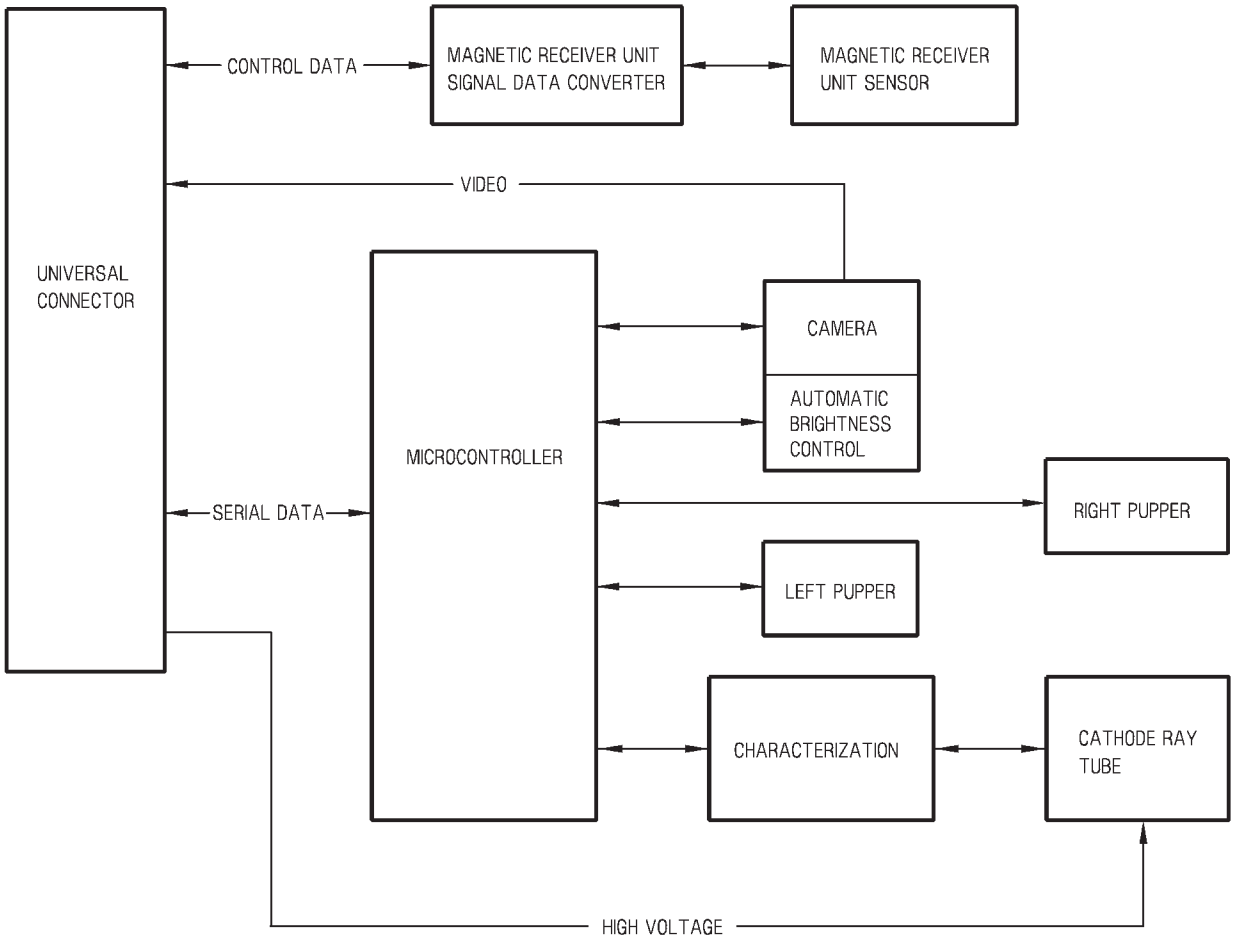

Figure 2. Helmet Display Unit Block Diagram

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